

**AN INDICATION OF THE VALUE OF ARTIFICIAL PROPAGATION OF
PEARLY MUSSELS**

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In 1913 there was practicalized through the investigations of Drs. George Lefevre and Winterton C. Curtis of the University of Missouri, an artificial method of propagation of fresh-water mussels. The method, based on the peculiar natural history of the mussels—especially on the parasitism of fishes by the embryo mollusks—is artificial only in that it requires the handling of the proper host fishes and the embryo mussels. The artificial propagative method is, indeed, merely assistance lent the natural reproductive processes, but by such assistance the plan results in a thousand fold increase over unaided reproduction. Complying with the requirements set by the natural propagative process of the mussel, the artificial method is simply the collection of a large number of fishes of appropriate species, their temporary confinement in a large receptacle of water, and the introduction into the water of a million or two glochidia (embryo mussels) of the mussel to be propagated. These glochidia are taken directly from the marsupia of a “ripe” gravid female shell. Within perhaps five or ten minutes the fishes so confined are quite heavily parasitized by the glochidia and, with an infection of possible 3,000 or more glochidia,—the amount of parasitism depending on the size of the fish, the temperature of the water, and other factors,—they are liberated into the water of their natural habitat where in due season the fully-matured embryos free themselves of their hosts and, dropping to the bottom, take up life as independent organisms.

This method of propagation has been carried on yearly since 1913 with a view toward repopulating the depleted mussel beds of several streams of the Mississippi drainage and, therewith, to furnish a continual supply of raw material for button manufacture.

During the past fall data have come to hand which suggest,

within certain limits, the value of this method of mussel propagation.

In 1913 propagating crews operating on the White River, Arkansas, under the direction of the U. S. Fisheries Biological Laboratory, Fairport, Iowa, liberated in that stream 4,500,000 embryo yellow sand-shells (*Lampsilis anodontoides*) on this species' hosts, the long- and short-nosed gars (*Lepisosteus osseus* and *platostomus*). The following two years there were liberated respectively 743,000 and 309,000 embryos of this mussel in the parasitic condition. After 1917 the propagation of the yellow sand-shell was discontinued because of inability to obtain gravid females of this species at the times when the crews operated on this river. When this work was done, the primary purpose of the propagation was to increase the muckets (*Lampsilis ligamentina*) of the river. This mussel may be propagated during seasons when it is impossible to obtain gravid sand-shells.

Through the kindness of Mr. F. C. Vetter, President of the Hawkeye Pearl Button Company, Muscatine, Iowa, there has been obtained shell-test records of 61 carload shipments of commercial shells from Augusta, Arkansas, on the White River in the vicinity of which town the sand-shell has been propagated. These tests covered shipments received by the company during the period from 1915 to 1921 inclusive. The test records of this company were taken on its own initiative and for its own purposes. Each record represents a single sample or two samples of 100 pounds each of the button shells as they arrived at the cutting plant in Muscatine. The samples were made by a shell-sorter and were taken as an index of the average assortment of shells of the different commercial species in the carloads and on the river bottom from which they came. A record has been kept of the percentage of yellow sand-shells, nigger-head shells (*Quadrula ebenus*), pimplebacks (*Q. pustulosa* and *pustulata*), washboards (*Q. heros* and *plicata*), and of miscellaneous shells, pigtoes (*Q. undata*), mapleleaves (*Q. lachrymosa*), etc.

TABLE I

ARTIFICIAL PROPAGATION OF THE YELLOW SAND-SHELL IN THE WHITE RIVER, ARKANSAS, AND ITS FREQUENCY IN COMMERCIAL SHELL SHIPMENTS FROM AUGUSTA

Year	Artificial propagation with sand-shell glochidia	Carloads	Per cent of yellow sand-shells in commercial shipments	Per cent of niggerhead sand-shells in commercial shipments
1913	4,500,000			
1914	743,000			
1915	309,000	3	¹ 0	¹ 76
1916	34,000	10	² 6.1	² 59
1917	11,000	4	7.2	56
1918 . . . . .	. . . . .	8	9.2	45
1919 . . . . .	. . . . .	10	11.6	49
1920 . . . . .	. . . . .	10	7.2	55
1921 . . . . .	. . . . .	16	6.7	47
Average. . . . .	. . . . .	. . . . .	³ 7.3	³ 51.3

Table I shows the extent of propagation of the yellow sand-shell during the period of years considered and the percentage of shells of this species and of niggerheads in carload shipments from Augusta, Arkansas, to the Hawkeye Pearl Button Company, Muscatine, Iowa. These two mussels are the only two species considered inasmuch as the others are of minor importance because of their comparatively much lower frequency and because of their smaller commercial value. Test records were begun by the button manufacturing company in 1915. Records of percentages of shells in shipments previous to this time are not available. Figures representing percentages of yellow sand-shells and niggerhead mussels are the averages of the test records taken during the given years. The 1915 record for

¹ Special shipment of three carloads containing no yellow sand-shells; these were sorted out for foreign shipment.

² Figures based on eight carloads; two of the ten carloads of this year were special carloads containing no yellow sand-shells.

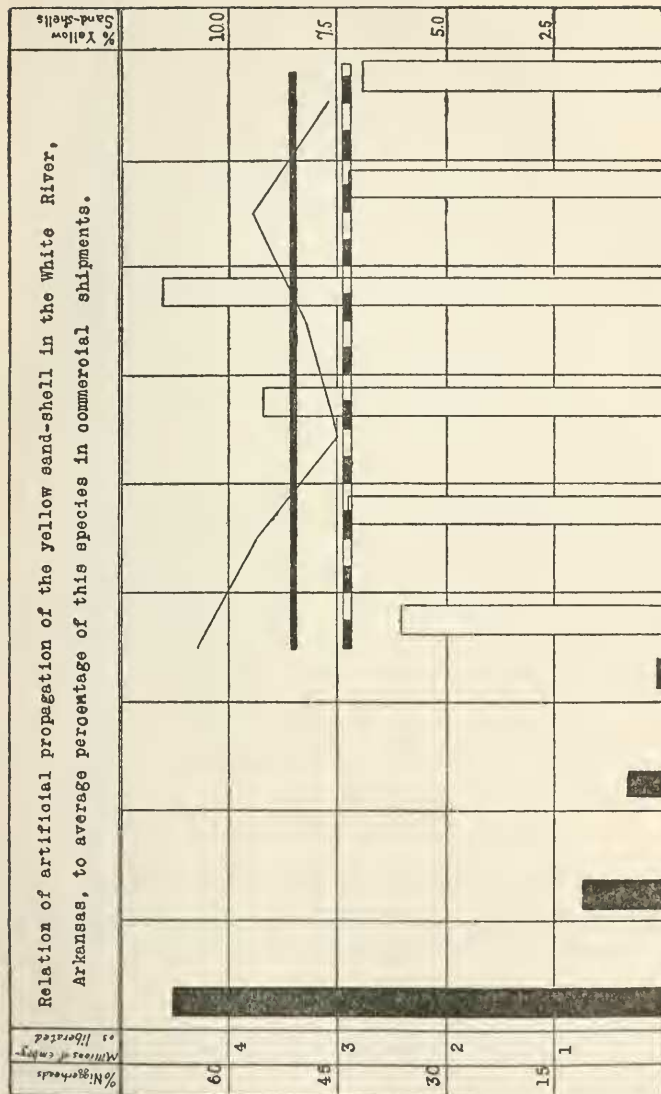
³ Omitting 1915 and 1916 special shipments.

niggerhead shells covers three shipments of that year of certain special carloads of shells sorted by the clambers to give a higher count of niggerhead shells and thus a better money return. The sand-shells were kept separate for sale to foreign shippers and, therefore, none were included in the shipments. The 1916 record also contained two similar carloads, but these have not been included in the computations.

From table 1 there is noted from 1917 through 1919 a marked increase of yellow sand-shells in carloads shipped from Augusta. This increase is, at its maximum, 4.4 per cent over the percentage of 1916 and 4.3 per cent over the average record of yellow sand-shells in 56 carloads. The increase in sand-shells cannot be due to special fishing and therefore to proportionately lowered frequency of the niggerhead mussel (the original and still the best pearl-button shell) inasmuch as the record for this species shows an increase in frequency of this shell during 1918 and 1919 during the years of marked increase in frequency of the yellow sand-shell. This increase in sand-shells occurred when the niggerhead frequency had been about its average frequency, 51.3 per cent.

The return of the frequency of yellow sand-shells in 1920 and 1921 to about normal percentage, 7.2 and 6.7 per cent respectively (the average being 7.0 per cent), would reasonably be expected in view of the marked decrease in artificial propagation after 1914. If the increase in percentage of yellow sand-shells found in 1918 and 1919 were due to artificial propagation, it would be fairly expected that when artificial propagation was discontinued, there would be, a proper number of years hence, a resultant falling-off in frequency of the mussel in question.

The marked yellow sand-shell increase of 1918 and 1919 is significant coming as it does from four to six years after the artificial propagation of this species in the vicinity from which the shipments here discussed were made. At the average growth-rate of the sand-shell, it requires from four to six years for a mussel of this species to attain salable size. This rate of growth would make an embryo of 1913 a mussel of commercial size in from 1917 to 1919.



Artificial propagation of Yellow Sand-shell. Average percentage of Yellow Sand-shells in commercial shipments. Average frequency of Yellow Sand-shells in carload shipments, 1916-1921 inclusive. Average percentage of niggerhead shells in commercial shipments. Average frequency of niggerhead shells in carload shipments, 1916-1921 inclusive.

While no data are at hand indicative of the comparative ages of the shells of the several years' shipments, it is learned from a number of shell buyers on the White River in the vicinity of Augusta and from others acquainted with the shipments here discussed that those of 1918, 1919 and 1920 contained a noticeable increase of shells of relatively young age, the epidermis of which is smooth and unscarred, in contradistinction to the old shells whose umbones are worn and eroded by the long action of the current, soil acids, and moving sand and gravel on the river bottom. On the test-record card of one of the carload shipments of 1920 was written, "Lots of good sand-shells."

It was conversation concerning the quality and age of the shells being obtained from the White River that led to the comparison of the records of artificial infection with the test records of the shipments.

The evident correlation existing, then, between time of artificial propagation, rate of growth and age of attainment of salable size, and noted increase in percentage of the species in question in commercial carload shipments, while not giving conclusive proof of the value of artificial propagation, does suggest the possible significance of this method of restocking the mussel beds of the streams of the Mississippi drainage.

TWO NEW BIVALVES FROM ARGENTINA

BY W. H. DALL

In a recent sending from Doctor Felippone of Montevideo, the following shells appear not to have been described. Both come from Mar de la Plata, Argentina.

PECTEN (CHLAMYS) FELIPPONEI n. sp.

Shell rounded, the adult slightly oblique, rather compressed, polished, scarlet or rosaceous, usually with zigzag irregular streaks of white on the left valve; the ears paler; hinge line straight, the ears rather large, subequal, in the left valve with only incremental sculpture, in the right valve the anterior ear has four or